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ARTICLE

Staying connected while on the move:

Cell phone use and social connectedness

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Abstract

As people integrate use of the cell phone into their lives, do they view it as just an update of the fixed telephone or assign it special values? This study explores that question in the framework of gratifications sought and their relationship both to differential cell phone use and to social connectedness. Based on a survey of Taiwanese college students, we found that the cell phone supplements the fixed telephone as a means of strengthening users' family bonds, expanding their psychological neighborhoods, and facilitating symbolic proximity to the people they call. Thus, the cell phone has evolved from a luxury for businesspeople into an important facilitator of many users' social relationships. For the poorly connected socially, the cell phone offers a unique advantage: it confers instant membership in a community. Finally, gender was found to mediate how users exploit the cell phone to maintain social ties.

Key words

cell phone • gender differences • gratifications of cell phone use • loneliness • shyness • social connectedness

The rapid diffusion of the cell phone worldwide is phenomenal.

According to an International Telecommunications Union (ITU) report (2002), the number of users across the world totaled one billion by 2001. Wireless technology expands telephone applications by empowering people on the move to use it anywhere and anytime (Bates et al., 2002). In addition to mobility and accessibility, the cell phone enlarges the scope of information content via PCS (Personal Communication Systems) to deliver such services as weather updates, news headlines, and internet access. These attributes, coupled with the rapid adoption of the cell phone worldwide, will undoubtedly change the way people live, work, and interact with one another, perhaps even more profoundly than did the fixed telephone. For instance, how do cell phone adopters use it? What role does the cell phone play in their lives? Moreover, as a new communication technology that offers unprecedented freedom in mobility, what does the cell phone give? What does it retain? And what does it take away?

Motivated by the pressing need to understand the socio-psychological impact of the rapid diffusion of the cell phone worldwide, this study aims to expand the research literature on the social role of the telephone by exploring how adopters use this new communication technology in their lives. More importantly, what is the role of the cell phone in maintaining the individual's family ties and social connectedness? What role does gratification seeking play, for instance, among users who want to stay socially connected?

The focus is timely because the cell phone represents a convergent new media technology that is both a two-way communication medium and a novel one-to-many information source. It is integrated into people's daily lives, and proved to be particularly valuable in emergency situations like the September 11 terrorist attacks in the USA. The cell phone enabled survivors to tell their loved ones, 'I am ok.' And it gave victims a chance to say 'I love you' one last time to family and friends. These instances highlighted the new, critical role of the cell phone in keeping family and community connected when other means of communications are denied. The present study thus will contribute to the research on cellular telephony with its focus on how the cell phone affects users' personal and social relations.

LITERATURE REVIEW AND RESEARCH QUESTIONS

Current research on the popularity of the cell phone worldwide includes studies on its function and uses (e.g., uses and gratifications), status symbols (e.g., the symbolic aspect of the cell phone), and use of cell phones at various locations (e.g., redrawing the boundary between public and private spaces) in various countries (Katz, 2003; Katz and Aakhus, 2002). A study about cell phone use in Finland, for example, reported widespread ownership of the cell phone across age groups and gender. More than 80

percent of users cited having a cell phone to deal with everyday business as their reason for owning one (Puro, 2002: 23). A similar pattern of rapid diffusion of the cellular telephone was found in Asian countries such as Japan and Hong Kong (Ishii, 1996; Wei, 2001).

Ling and Yttri (2002) explored how the cell phone is integrated into users' daily lives as a coordinating device in Norway. They proposed two forms of social interaction via the cell phone: instrumental (i.e., calls for safety and security) and expressive (i.e., the cell phone as an element of self-presentation). Men were found to use the cell phone more than women do from work. Nearly half of the calls via the cell phone were made at work, indicating its critical role in co-coordinating day-to-day activities (Ling and Haddon, 2003). Further, Ling and Yttri (2002; Ling, 2000) found teen users tend to use the cell phone for expressive purposes.

Gratifications-sought as motivation for media use

The above-mentioned research on the cell phone provides a broad context for the present study, which utilizes the uses and gratifications theoretical approach as a guiding framework. Focusing on the motivations and behavior of audience, particularly on why and how they use a given medium, the uses and gratifications approach has been successfully applied in previous research on telecommunication technologies, including the cell phone (see a full review next). As mentioned earlier, the use of the cell phone varies a great deal. The uses and gratifications approach provides an adequate framework for studying the cell phone because it assumes that individual differences cause each user to seek out different media and use the media differently. The approach essentially provides a user-centered perspective, which is desirable in studying the use of cell phones. In the words of Fischer (1992: 28), the role of a new media technology (such as cellular telephony) in users' lives is better understood when it is pursued as users 'making purposeful choices under constraints'.

The uses and gratifications approach assumes that the audience actively selects and uses its media, and that how individual audience members employ these media depends on their social and psychological needs as well as gratification-seeking motives (Katz et al., 1973). The notion of an active audience implies utility (i.e., the uses people have for communication), intentionality (i.e., prior motivation that directs communication behavior), and selectivity (i.e., prior interest and desires that affect communication choices and content) (Blumler and Katz, 1974; Palmgreen et al., 1985). The uses and gratifications approach is most productive in identifying a wide range of reasons or motivations for choices in media use, notably newspaper reading (Lichtenstein and Rosenfeld, 1984), television viewing (Rubin, 1983), the VCR (Rubin and Bantz, 1987), and use of the internet (Charney and Greenberg, 2002). Numerous studies on uses and gratifications have led

to the general conclusion that the gratifications sought indeed motivate an audience member's use of a particular medium as the audience member attempts to fulfill his or her psychological needs such as surveillance, entertainment, relaxation, para-social interaction, and companionship (Lin, 1993).

The uses and gratification framework guided past research on both the fixed telephone and the new wireless phone. Studies by Keller (1977) and Noble (1987) on the use of the conventional telephone were seminal. They differentiated telephone uses into two broad motives or gratifications: intrinsic or social and instrumental or task-oriented. Intrinsic motivations refer to calling to socialize – to chat, gossip, keep family contacts, and achieve a sense of security. Instrumental motivations include calling to make appointments, order products, obtain information, and the like. The Keller and Noble findings showed that social uses were more frequent than utilitarian uses.

Another study by Claisse and Rowe (1987) proposed functional and relational motives as gratifications sought from telephone use. Williams et al. (1985) expanded the gratifications categories by adding a fun or entertainment motive. Teenagers, in particular, view phoning as fun. Dimmick et al. (1994) identified yet another gratification factor labeled reassurance. That is, using the telephone to fulfill one's psychological needs for feeling secure. More recently, O'Keefe and Sulanowski (1995) elaborated gratifications sought through telephone use and examined how differences in gratifications sought affected individual telephone behavior. They identified a mix of interpersonal and mass media gratification factors as motives for telephone use, including sociability, entertainment, acquisition, and time management. They also found that the greater the motives for entertainment, time management, and social interaction, the more time telephone users spent calling.

A study by Leung and Wei (1998) focusing on gratifications sought from pager use by college students identified a new factor: fashion and status. For late adopters, a pager conferred social identity and became a symbol of being cool. The unique gratification sought was integrated into peer networks. This newly found motive was confirmed in cell phone use (Leung and Wei, 2000). In addition, the Leung and Wei study (2000) suggested two other gratifications for cell phone use: mobility and immediate access.

Based on the above review of major gratifications of both the fixed and the cellular phone, the first research question explores how these gratification dimensions result in using the cell phone differently.

RQ1: To what extent are gratifications sought from the cell phone related to differential uses of the cell phone?

The social-psychological role of the telephone in relational maintenance

The mode of social relations can be differentiated into *non-mediated connections* and *mediated connections* (Cerulo and Ruane, 1998). Face-to-face communication dominates the conceptualized role of non-mediated connections in relationship maintenance (Canary and Stafford, 1994). The physical presence of two interactive parties is assumed to be ideal (Stafford et al, 1999). Accordingly, direct, physically co-present communications were considered 'primary relations;' while indirect, faceless, mediated connections were considered 'secondary relations' (Cerulo and Ruane, 1998).

However, as Wellman and Guila (1999) argue, interpersonal ties can be maintained by mediated connections via communication technologies such as the telephone. As new communication technologies become increasingly domesticated, Stafford et al. (1999) further propose that computer-mediated communication, especially email, will sustain face-to-face interaction and maintain personal relations.

Focusing on the social role of the conventional telephone, past research (Pool, 1977), suggests that the fixed telephone facilitated the transformation of America into a decentralized matrix of what Aronson (1971) called 'intimate social networks,' geographically scattered 'psychological neighborhoods'. The telephone's ability to provide ready connectedness and support immediate interaction has made it an essential instrument for maintaining one's 'psychological neighborhoods', which represent 'a supportive community' according to Wurtzel and Turner (1977: 256). The social value of the telephone was evidenced by its effectiveness as a communication medium for reducing loneliness, isolation, and anxiety (Fischer, 1992). At the same time, it increased a sense of security and maintained cohesion within family and friendship groups (Aronson, 1971; Fischer, 1992). Empirically, the number of calls correlated positively with the strength of a relationship (Wellman and Tindall, 1993). As Wurtzel and Turner (1977: 257) put it, a primary socio-psychological function of the telephone is the 'maintenance of symbolic proximity'.

Empirical studies on home email show that it is used primarily for maintaining person-to-person relationships (Stafford et al., 1999). The home email study also found that gratification opportunities mediated the use of email at home to maintain relations formed by other means. The Leung and Wei (2000) study also reported that instrumental gratifications motivated the use of the cell phone with co-workers and business partners, whereas mobility and affection gratifications were strongly related to using the cell phone to connect with family members. These findings are consistent with earlier studies on loneliness, gratifications, and TV viewing. Chronic loneliness was related to reduced use of three interpersonal communication channels: friends, family members, and social activities (Finn and Gorr,

1988; Rubin et al., 1985). Chronic loneliness was also associated with greater viewing of soap operas and less viewing of exciting or social utility programs (Perse and Rubin, 1990).

Theoretically, loneliness is related to shyness, which has been characterized as a non-evaluative emotion centered on an individual's discomfort toward others (Izard and Tyson, 1986). Shy people experience feelings of anxiety and are withdrawn and uncomfortable in social situations (Kagan et al., 1988). Highly shy persons talk significantly less and make significantly less eye contact. As a result, they tend to participate minimally in social interactions (Garcia et al., 1991) and experience loneliness. Similarly, other studies report that social connectedness is negatively related to anxiety (Lee and Robbins, 1998). Not surprisingly, more recent studies have found that loneliness, social distress avoidance, social discomfort, and a host of other negative emotions are negatively correlated with social connectedness (Baumeister and Leary, 1995; Lee et al., 2001).

What is the effect of the cell phone on the user's relationship maintenance? Related to this question, what is the role of gratifications sought in helping the cell phone user stay socially connected? Do they mediate cell phone use? If so, how? The second research question is posed as follows:

RQ2: What is the relationship between gratifications sought from the cell phone and the levels of social connectedness in terms of loneliness and shyness?

Gender differences in telephone use

The adoption and use of a media technology are socially conditioned (Fischer, 1992). Social groups experience a given new media technology differently due to their differences in social structures. Gender exemplifies such differences. Past empirical research reported significant gender differences in use of the fixed telephone. Using the phone more and talking longer, women used it primarily for social purposes, such as to keep in touch with family and friends, to exchange information about community, and to keep them company (Fischer, 1992; Smoreda and Licoppe, 2000). Other historical analyses (Martin, 1991) reached similar conclusions. Focusing on women's use of the telephone in a small community, Rakow (1992: 149) argued that telephone lines ran 'like a fine thread through the lives' of women who were more likely to experience isolation, loneliness, fear, or boredom. Her study concluded that the telephone 'builds and maintains relationships and accomplishes important care-giving and receiving functions' for women (1992: 151). The theme was found in interviews with 19 women who were early users of the cellular telephone (Rakow and Navarro, 1993).

More broadly, gender differences were studied in computer-mediated communications (ranging from email, listserv, and newsgroups to chat

rooms) focusing on issues of access to internet resources and use of such resources. Herring (2001: 3) argued that access was a 'stumbling block' for women during most of the 1990s. The gender digital divide was bridged as more women went online, accounting for 51 percent of internet users in the USA in 2002 (NUA, 2002). Patterns of internet use also differed along the gender line. Women tend to exchange more private email than participate in discussions or chat rooms (Hoffman et al., 1996). Other empirical studies show that women posted fewer and shorter messages, received fewer responses from others, and did not control the topic of discussion (Herring, 1993, in press). However, they participated more actively in other online opportunities such as women-centered groups (Herring, 2000).

Will these gender differences be found in motives of cell phone use? We raise the third research question as follows:

RQ3: Are there gender differences in gratifications sought from the cell phone?

METHOD

The cell phone was introduced to Taiwan in 1989 as a luxury among a handful of business tycoons. According to the Directorate General of Telecommunications (GDT) of Taiwan, Taiwan led the world in cell phone adoption – more than 22 million of its 23 million residents were cell phone subscribers, a penetration rate of 96.6 percent in 2001 (2002). The penetration rate of cell phones among the segment aging between 16 and 60 in Taiwan soared as high as 130 percent as many of them had a second phone (Kao, 2002). Thus, Taiwan represents an ideal population to investigate the social influence of cell phone use. Our study drew on a sample of Taiwanese college students.

We used a multistage cluster sampling method. First, we drew 10 out of a pool of 26 colleges in Taipei. Then, three classes from each of the 10 colleges were randomly selected. In the final stage, the questionnaire was administered to students enrolled in the 30 classes in May 2001.

Participation was voluntary and respondents were assured of complete anonymity. Trained undergraduate seniors of a large university distributed and collected the self-administered questionnaires. Among the 1050 students in the sampled classes, a total of 909 (86.6%) completed the questionnaire.

Of the sample, 378 (41.6%) were males and 531 (58.4%) were females. The Mean age was 19.76 (SD = 1.45, ranging from 18 to 25). Out of the 909 respondents, 881 (96.9%) were cell phone users, while only 28 (3.1%) were non-users. Among the 881 users, 843 (95.7%) had their own cell phones, and 140 (15.9%) reported owning two or more. They had owned cell phones for periods ranging from one month to four years (Mean = 17.31 months, SD = 9.71).

Gratification measures. Drawing on motives identified in previous studies on uses and gratifications from the fixed telephone (Dimmick et al., 1994; O’Keefe and Sulanowski, 1995) and the cell phone (Leung and Wei, 2000), our survey used a list of 34 gratification items (we finalized the list based on a pilot study). Principal component factor analysis of these items with varimax rotation led to a six-factor solution, accounting for 74.19 percent of variance. Based on results of principal component factor analysis of the cell phone motive statements, six highly reliable gratification indices were created (see Table 1).

The first gratification, *information-seeking*, contained five items including seeking updated information on traffic, social events, stocks, news headlines, and consumer and entertainment topics (Mean = 2.47, SD = 0.77). This factor represents a gratification typical of instrumental use. The second gratification, *social utility*, consisted of five items that reflected the motives of using cell phone to relieve boredom, to gossip or chat, to seek the pleasure of talking, to pass time, and to relax (Mean = 2.81, SD = 0.86). *Affection*, the third gratification-sought, consisted of five items: improving relations with family, feeling closer to family members, showing caring for others, knowing others care about you, and saying ‘hi’ to people (Mean = 3.26, SD = 0.73). The fourth gratification, *fashion and status*, consisted of four items. It marked the use of the cell phone for looking fashionable, cool, stylish, and avoiding looking old-fashioned (Mean = 2.57, SD = 0.79). These three gratifications are typical of social or intrinsic motives.

The fifth gratification, *mobility* contained three items that reflected the use of the cell phone as eliminating the need to look for a public phone, to carry change required to use a public phone, and to queue up for public phones (Mean = 3.73, SD = 0.86). The sixth gratification, *accessibility*, included three items: being always accessible regardless of location, providing immediate access to others anywhere anytime, and being available to the ill or aged members of the family (Mean = 3.94, SD = 0.68). *Mobility* and *accessibility* represent new and unique gratification dimensions from cell phones and, based on mean scores, are the most sought after gratifications by cell phone users.

Cell phone use. When the study was conducted in May 2001, text messaging, photo messaging, and other newer services like mobile internet were not available. Therefore, we focused primarily on use of the cell phone for making and receiving voice calls. Operationally, cell phone use was measured with multiple measures. Respondents were asked to indicate how long they had owned a cell phone (in months). (Mean = 17.31, SD = 9.71); and how many cell phones they owned (Mean = 2.15; SD = 0.56). Then, they were requested to self-report the number of calls (both made and

• Table 1 Principal component analysis of uses and gratifications items with varimax rotation

USE AND GRATIFICATION ITEMS	F1	F2	F3	F4	F5	F6
Information-seeking						
To seen traffic updates	0.91	0.10	0.00	0.00	0.00	0.00
To keep up-to-date with social events	0.90	0.15	0.00	0.00	0.00	0.00
To see updates on stocks	0.90	0.14	0.00	0.00	0.00	0.00
To check news headlines and weather updates	0.87	0.00	0.13	0.10	0.00	0.00
To find out consumer and entertainment information	0.74	0.26	0.11	0.18	0.00	0.11
Social utility						
To relieve boredom by calling people	0.11	0.86	0.10	0.15	0.00	0.00
To gossip or chat	0.22	0.80	0.00	0.17	0.00	0.10
To enjoy the pleasure of talking to people	0.13	0.78	0.20	0.17	0.00	0.13
To pass time	0.20	0.76	0.00	0.19	0.00	0.00
To relax me	0.16	0.75	0.24	0.19	0.10	0.00
Affection						
To improve relations with family	0.16	0.00	0.84	0.10	0.00	0.00
To feel closer to family members	0.12	0.00	0.81	0.14	0.00	0.00
To let others know you care for them	0.00	0.19	0.80	0.18	0.12	0.00
To get a feeling that people care about you	0.00	0.13	0.77	0.12	0.00	0.00
To say hi to people who care about you	0.00	0.29	0.64	0.00	0.15	0.17
Fashion-status						
To look fashionable	0.12	0.15	0.17	0.89	0.00	0.00
To look cool	0.17	0.18	0.14	0.88	0.00	0.00
To look stylish	0.17	0.19	0.18	0.86	0.00	0.00
To avoid looking old-fashioned	0.00	0.24	0.10	0.75	0.00	0.00
Mobility						
To eliminate the need to queue up for public phone	0.00	0.11	0.00	0.00	0.89	0.00
To eliminate the need for change required to use public phone	0.00	0.16	0.00	0.00	0.88	0.00
To avoid the need of looking for a fixed public phone	0.00	0.00	0.00	0.00	0.80	0.25
Accessibility						
To provide immediate access to others anywhere anytime	0.00	0.17	0.00	0.00	0.00	0.84
To be always accessible to anyone no matter where you are	0.00	0.18	0.00	0.00	0.13	0.82
To be available to the ill or aged members of the family	0.15	-0.10	0.24	0.00	-0.11	0.65
Eigenvalues	70.57	20.96	20.56	20.27	10.80	10.40
Cronbach's alpha	0.94	0.90	0.86	0.91	0.85	0.72
Variance explained (%)	30.26	11.82	10.25	9.07	7.20	5.59

Note: Scales for uses and gratifications items were '1' = strongly disagree to '5' = strongly agree.

received) in a day (Mean = 7.03, SD = 5.32). They were also asked to provide an estimate of time (in minutes) for each call (Mean = 3.5, SD = 4.6).

Respondents were further asked to report how often they used their cell phones to contact (a) family members – parents and siblings who live together with the respondent; (b) relatives – uncles, aunts, and cousins who do not live together with the respondent; (c) schoolmates; (d) co-workers; (e) friends of same sex; and (f) friends of opposite sex (friends exclude schoolmates). The response categories ranged from ‘1’ (never) to ‘4’ (often). A two-factor solution emerged from a principal component factor analysis, explaining 60.63 percent of the total variance. The first factor, which accounted for 37.47 percent of the variance (Eigenvalue = 2.25), contained the four items (c, d, e, and f). The four items were added and divided by four to form a composite measure of *frequency of social-oriented calls made* (Mean = 3.06, SD = 0.62, alpha = 0.71). The second factor included two items (a and b) (Eigenvalue = 1.39; accounting for 23.16% of variance). The two items were added and divided by two to build a measure of *frequency of family-oriented calls made* (Mean = 2.58, SD = 0.64, $r = 0.35$).

Respondents were next asked how often they *received* a call via their cell phone from (a) family members – parents and siblings who live together with the respondent; (b) relatives – uncles, aunts, and cousins who do not live together with the respondent; (c) schoolmates; (d) co-workers; (e) friends of the same sex; and (f) friends of the opposite sex (friends exclude schoolmates). A principal component factor analysis showed these six items also grouped into two factors. The two-factor solution explained 62.65 percent of the total variance. Four items (c, d, e, and f), which loaded on the first factor, were combined to form a measure of *frequency of social-oriented calls received* (44.81% of the variance was accounted for, Eigenvalue = 2.69; Mean = 3.06, SD = 0.65, alpha = 0.74). The second factor had two items (a and b) (Eigenvalue = 1.07; accounting for 17.84% of variance). The two items were added and divided by two to form a measure of *frequency of family-oriented calls received* (Mean = 2.67, SD = .68, $r = .36$).

Mass media use. To provide a comparison with cell phone use, respondents were asked to indicate their level of mass media consumption. Specifically, they self-reported the average time (in hours per day) spent watching TV (Mean = 2.27, SD = 1.66), listening to the radio (Mean = 47.86 minutes; SD = 1.21), and surfing the internet (Mean = 2.12, SD = 1.93). Newspaper and magazine reading were measured by two separate questions asking respondents how many days in a week they read the press (Mean = 3.26 and SD = 1.71 for newspaper reading; Mean = 2.35 and SD = 1.56 for magazine reading).

Measures of social connectedness. Teixeira (1992: 36) defines social connectedness as ‘interpersonal, community, and general social ties’. As Lee et al. argue:

People with high connectedness tend to feel very close with other people, easily identify with others, perceive others as friendly and approachable, and participate in social groups and activities. . . . People with low connectedness tend to feel interpersonally distant from other people and from the world at large. They often see themselves as outsiders, feel misunderstood by others, have difficulty relating with the social world, and are uncomfortable in social situations. (2001: 310)

Accordingly, as the dependent variable of the study, the level of ones' social connectedness was gauged by two separate measures which were essentially psychological indices of a respondent's social deficiency: loneliness and shyness.

Loneliness. Following Peplau et al. (1979), loneliness is defined as a self-perceived state that a person's network of relationships is either smaller or less satisfying than desired. The study used the revised UCLA Loneliness Scale constructed by Russell et al. (1980), which emphasized the cognitive aspect that a person believes that he or she has fewer initial social relationships than desired or achieved. Specifically, respondents in our sample were given a list of 20 emotions and were asked to report how frequently they experienced them in their interpersonal relationships. The list used a '1' (never) to '4' (often) point scale (Mean = 39.53, SD = 8.74, alpha = 0.90).

Shyness. Conceptually, shyness is also linked to one's social relations. It refers to the discomfort and inhibition that may occur in the presence of others (Cheek and Buss, 1981). A nine-item *shyness* scale was employed following Cheek and Buss (1981). Respondents were asked to rate the nine statements on a '0' to '4' scale, where '0' meant 'least characteristic of me' and '4' meant 'most characteristic of me' (Mean = 16.08, SD = 5.25, alpha = 0.84).

Social structural variables included gender, age, year of study, GPAs, family size, and household income.

RESULTS

The first research question inquired to what extent cell phone gratifications were sought related to cell phone use, which was measured as: (1) frequency of family-oriented calls made, (2) frequency of social-oriented calls made, (3) frequency of family-oriented calls received, and (4) frequency of social-oriented calls received. To explore the multivariate relationship of the six identified cell phone gratifications and the four types of uses, four hierarchical multiple regression analyses were performed separately.

As shown in Table 2 (the first column), *affection* was the strongest predictor of how often respondents made calls to families or relatives. Other gratifications sought that were significant predictors of the frequency of

• Table 2 Hierarchical regression analysis predicting cell-phone use

INDEPENDENT VARIABLES	FREQUENCY OF	FREQUENCY OF	FREQUENCY OF	FREQUENCY OF
	FAMILY-CALLS MADE	SOCIAL-CALLS MADE	FAMILY-CALLS RECEIVED	SOCIAL-CALLS RECEIVED
Block 1: Social structural variables				
Gender (male)	-0.08*	-0.16**	-0.10**	-0.19***
Age	0.07	-0.01	-0.01	-0.01
Family size	-0.04	-0.01	-0.06	-0.0
Household income	-0.01	0.01	-0.05	0.02
Year of study	-0.05	-0.03	-0.06	-0.08**
GPA's	0.03	-0.02	0.00	-0.02
Adjusted R ²	0.9%	2.2%	1.5%	2.9%
Block 2: Cell-phone gratifications				
Information-seeking	-0.05	-0.05	-0.03	-0.02
Social utility	-0.11**	0.15**	-0.07	0.15***
Affection	0.26***	-0.01	0.28***	-0.01
Fashion-status	-0.08*	-0.01	-0.03	-0.00
Mobility	-0.02	0.06	-0.06	0.02
Accessibility	0.07*	0.06	0.07*	0.10**
Incremental adjusted R ²	9.0%	10.0%	10.1%	10.3%
Block 3: Cell-phone use				
No. of cell phones owned	0.12**	0.14**	0.10**	0.18***
Length of cell phone owned	0.07*	0.23***	0.09*	0.22***
Total cell-phone use per day	0.08*	0.25***	0.09*	0.25***
Averaged calling time	0.02	0.06*	0.03	0.04
Incremental adjusted R ²	3.4%	19.2%	3.5%	19.8%
Total adjusted R²	13.3%	31.4%	15.1%	33.0%

Notes: Beta weights are from final regression equation with all blocks of variables in the model. Variables coded, or recoded, as follows: gender (1 = male, 0 = female); uses and gratifications variables (1 = strongly disagree, 5 = strongly agree); frequency of family-oriented use and social-oriented use (1 = never, 4 = frequently). ****p* < 0.001; ***p* < 0.01; **p* < 0.050.

family-oriented calls made included *social utility*, *fashion-status*, and *accessibility*. These results suggest that those respondents who were motivated to use the cell phone to express affection and to take advantage of its access, but not to socialize or to make a fashion statement, tend to call their loved ones more frequently. Results of the regression analysis also revealed significant relationships between the number of cell phones a respondent owned, the length of time the respondent had owned a cell phone, total use per day, and the frequency of making family-oriented calls. Those who had more than one cell phone, used them longer, and used them more frequently every day, called their loved ones more often. Gender was the only social

structural variable that significantly predicted frequency of family-oriented calls made. Female respondents were inclined to make more calls to family.

Social utility was a significant predictor of the frequency of making social-oriented calls via the cell phone (see the second column in Table 2). Moreover, the more those surveyed owned more cell phones, used them longer, used them more frequently in a day, and made longer calls, the more frequently they made social calls. Obviously, the cell phone has become a new way of life for early and heavy users in maintaining their social relations. In addition, gender was also a significant predictor of frequency of socially-oriented calls made. Female respondents tended to make more social calls.

Affection and *accessibility* were again significant predictors of frequency of family-oriented calls received in the gratifications-sought block (see the third column in Table 2). Three general cell phone use variables showed predictive utility over the frequency of receiving family-oriented calls: number of cell phones owned, length of cell phone use, and total use in a day. Also, gender was a significant predictor of frequency of family-oriented calls received, indicating that females received family calls more often.

As shown in the fourth column of Table 2, *social utility* and *accessibility* predicted the frequency of receiving socially-oriented calls. Compared to social-oriented calls made, *accessibility* was a significant motive, suggesting that the immediate access afforded by cell phones helped respondents receive social calls while on the go. When the influence of social structural variables and cell phone gratification measures were controlled for, the number of cell phones owned, length of use, and total use per day were significant predictors of the frequency of socially oriented calls received. Total use in a day was the strongest predictor. Gender also showed predictive power, suggesting that females received social calls more frequently.

The second research question concerned the multivariate relationships between dimensions of cell phone gratifications, mass-media use, cell phone use, and one's degree of social connectedness, which were measured by loneliness and shyness. Statistically, cell phone uses and gratifications from cell phone use were treated as covariates of loneliness and shyness. Cell phone uses included both general level of use and types of use (i.e., family oriented and social oriented). The partial correlation between loneliness and cell phone use was calculated after controlling for social structural variables and mass-media use variables. A similar partial correlation was run for shyness (see Table 3).

As Table 3 shows, there was a significant but negative relationship between the *affection* and *accessibility* gratifications and loneliness after the influence of social structural variables and mass-media use were taken into consideration (see the first column). However, the relationship between loneliness and the gratification of *fashion-status* was positive. Results further

• Table 3 Partial correlation coefficients between loneliness, shyness, cell-phone gratifications and cell-phone use indices (Control for gender, age, family size, household income, year of study, GPAs, TV viewing, radio listening, newspaper and magazine reading, and internet surfing)

INDEPENDENT VARIABLES	LONELINESS	SHYNESS
Cell-phone gratifications		
Information-seeking	-0.03	-0.06
Social utility	-0.06	-0.17***
Affection	-0.16***	-0.11**
Fashion-status	0.08*	0.01
Mobility	-0.01	0.01
Accessibility	-0.10**	-0.04
Cell-phone use		
No. of cell phones owned	-0.04	-0.11**
Length of cell phone owned (in months)	-0.14***	-0.24***
Total cell-phone use per day	-0.15***	-0.29***
Average calling time	-0.07	-0.12**
Freq. of family-oriented use	-0.02	0.02
Freq. of social-oriented use	-0.21***	-0.29***

Notes: Variables coded, or recoded, as follows: uses and gratifications variables (1 = strongly disagree, 5 = strongly agree); frequency of family-oriented use and social-oriented use (1 = never, 4 = frequently); loneliness (1 = never, 4 = often); shyness (0 = least characteristic of me, 4 = most characteristic of me). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

showed that these respondents were later adopters of the cell phone. Loneliness was negatively related to the frequency of social-oriented use, total use per day, and length of owning a cell phone.

An interesting pattern emerged from the above results. Lonely respondents (i.e., those less socially connected psychologically) sought to use the cell phone *not* as a means to express affection or for the benefit of immediate access while on the go. Rather, they pursued the cell phone for its symbolic value – fashion and status. Not surprisingly, they did not use the cell phone socially and did not use it much on a daily basis.

Similar results were obtained in the partial correlation between shyness and cell phone gratifications and cell phone use (see the second column in Table 3). The relationships between shyness, *social utility*, and *affection* gratification were negative after controlling for the influence of social, structural and mass-media variables. Other significant correlates of shyness were total use of cell phone per day, frequency of social uses, length of cell phone ownership, averaging calling time, and number of cell phones owned. All of them were negative. Thus, the general pattern of relationships between shyness, cell phone gratifications and use paralleled that of self-reported loneliness. Respondents who had a high self-reported shyness level perceived the cell phone *neither* for social utility nor for affection motives. As later adopters of the cell phone, they used the cell phone less. When

• Table 4 *T*-tests between female and male users in cell-phone gratifications-sought and cell-phone use

VARIABLES	MALE	FEMALE	T-VALUES
Cell-phone gratifications			
Information-seeking	2.54 (0.83)	2.43 (0.71)	2.06*
Social utility	2.78 (0.90)	2.83 (0.83)	-0.95
Affection	3.12 (0.80)	3.37 (0.67)	-5.07***
Fashion-status	2.57 (0.85)	2.58 (0.73)	-0.08
Mobility	3.59 (0.89)	3.82 (0.84)	-4.04***
Accessibility	3.90 (0.72)	3.97 (0.65)	-1.60
Cell-phone use			
No. of cell phones owned	2.20 (0.66)	2.12 (0.48)	1.90
Length of cell phone owned	19.09 (1.74)	16.7 (8.67)	4.54***
Total cell-phone use per day	6.28 (5.48)	7.35 (5.16)	-2.99**
Averaged calling time	3.65 (5.11)	3.57 (4.63)	0.24
Frequency of family-calls made	2.53 (0.64)	2.62 (0.64)	-2.02*
Frequency of social-calls made	2.95 (0.66)	3.14 (0.57)	-4.56***
Frequency of family-calls received	2.57 (0.70)	2.73 (0.66)	-3.40***
Frequency of social-calls received	2.93 (0.69)	3.15 (0.61)	-4.90***

Notes: Scales for uses and gratifications items were '1' = strongly disagree to '5' = strongly agree.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

they did use their cell phones, they used them less for socializing and tended to make short calls. Surprisingly, lonely and shy respondents tended to own more cell phones, probably just to make a status statement.

The third research question asked: Do female users of the cell phone differ from male users in gratifications sought from cell phone use? To answer this question, a series of paired *t*-tests was run. As Table 4 indicates, female and male users differed significantly in seeking the gratifications of *information-seeking*, *affection*, and *mobility*. Female users tend to use the cell phone for expression of affection and to take advantage of the mobility of the wireless technology, whereas male users appear to use cell phones to seek information. Moreover, results show that females reported using the cell phone more every day, made and received more family-oriented as well as social-oriented calls, although males owned their cell phones longer (see Table 4). These results are consistent with the gender difference in household telephone use (Ling and Haddon, 2003; Rakow, 1992; Smoreda and Licope, 2000).

DISCUSSION

The study highlights the influence of gratifications sought from cell phone use as antecedents on family-oriented and social-oriented calls. The *affection* gratification had a positive relation with calls to family. It is reasonable to conclude that the cell phone enhances one's ties to family. Moreover, the

social utility gratification was a strong predictor of social uses. Motivated to relieve boredom or to relax by chatting via cell phone, early adopters of cell phones used them more often and made longer calls, primarily to socialize. Thus, the cell phone became a new type of pleasure phone, one that evolved from a luxury business phone into an important facilitator of one's social relationships.

More important, when dimensions of cell phone gratification and cell phone use were analyzed as covariates of users' levels of social connectedness in terms of loneliness and shyness, people who were less socially connected adopted the cell phone late and used it less for social purposes. Nevertheless, they extracted social compensation from the cell phone by using it symbolically as a marker of fashion and status. To do so, they used the cell phone primarily as a fashion accessory. Thus, late and socially deficient users of cell phones present themselves socially through the symbolic display of the cell phone. This particular finding provides empirical evidence to support the notion of technology as one's 'second-skin' (Katz, 2003; Katz and Aakhus, 2002). As Lee (2002: 3) puts it, as 'a social prop,' cell phones are 'smart skins' for young people.

Furthermore, gender was consistently a significant predictor of cell phone uses, regardless of whether the use was family-oriented or social-oriented. As the results of *t*-test analyses indicate, women rely more heavily than men on extensive use of cell phones to show affection to their families while on the move. In contrast, men tend to use the cell phone for the sake of efficiency and practical purposes, such as information-seeking. The findings support the argument by Lee and Robbins (2000: 485) that 'women and men both value social connectedness, but there may be differences in the types of relationship that women and men pursue to develop or sustain a sense of connectedness.' It thus can be concluded that gender mediates how users exploit the cell phone to maintain social ties.

To conclude, as the cell phone is becoming integrated into people's lives, it supplements the role of the fixed telephone in meeting the need for relationship maintenance. Consistent with the primary social functions of the household telephone, mobile communication via the cell phone helps strengthen bonds among family members. It also expands the user's 'psychological neighborhoods' and facilitates 'maintenance of symbolic proximity' (especially true for both female and heavy users). As a new wireless communication medium, the cell phone itself represents a symbolic community. It confers a unique advantage to those who are not socially well connected by offering a trendy fashion accessory – strap a cell phone around your neck or on your belt, and you instantly become a member of a community, whether you actually use the phone or not. Accordingly, the cell phone has become what Csikszentmihalyi and Rochberg-Halton (1981: 33) call 'symbols of social integration' in the era of mobile communication.

The findings of this study should be interpreted with caution, as the study sampled college students. Future research should target a sample of the general population. In addition, future study should attempt a causal model to delineate the direction of relationships between cell phone gratifications, cell phone uses, and various dimensions of social connectedness. Finally, US adolescents have lagged behind their Asian and European counterparts in embracing the cell phone, but they are catching up rapidly. A cross-cultural comparative analysis of US and Asian or European young users of the cell phone is yet another desirable path for future research.

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